

HISTORIC AMERICAN ENGINEERING RECORD

WHITE RIVER BRIDGE

(DeValls Bluff Bridge)

HAER NO. AR-21

LOCATION: U.S. Highway 70, spanning the White River at DeValls Bluff, Prairie County, Arkansas.

UTM: 15/3850690/642200

Quad: DeValls Bluff, Arkansas

DATE OF CONSTRUCTION: 1924

ENGINEER: Harrington, Howard and Ash, Consultant Engineers, Kansas City, Missouri.

BUILDER: Missouri Valley Bridge and Iron Company, Leavenworth, Kansas.

PRESENT OWNER: Arkansas State Highway and Transportation Department.

PREVIOUS OWNERS: White River Bridge Company, Arkansas.
White River Bridge Company, Inc., Delaware.
White River Bridge Corporation, Delaware.

PRESENT USE: Vehicular bridge

SIGNIFICANCE: The vertical lift bridge at DeValls Bluff over the White River is one of only two such bridges in the state. It was designed in 1923 by the Missouri firm of Consultant Engineers, Harrington Howard and Ash, for the White River Bridge Company of Little Rock. Built by one of the more important bridge building companies, the Missouri Valley Bridge and Iron Company, in 1924, it remains today as a tribute to its prime motivator Harry E. Bovay, an entrepreneur from Stuttgart, Prairie County.

HISTORIAN: Sean O'Reilly

DESCRIPTION: Corinne Smith

Arkansas Historic Bridge Recording Project, 1988.

MEMPHIS TO LITTLE ROCK

The first mail route established between Little Rock and Memphis commenced operation in 1824 over practically the exact route of the present (1936) U.S. Highway 70. This route known as the "Trail of Tears" is the route used in moving the Cherokee Indians from their lands east of the Mississippi to those in the west.(1)

U.S. Highway No. 70, part of which formed the historic link between Memphis, Tennessee and Little Rock, Arkansas, was developed in the early decades of this century as one of the most important routes in the State of Arkansas.(2) Its informal title "The Broadway of America" recognized its national importance. Highway 70, between these two cities, formed a part of the route from the Atlantic to the Pacific coast, and its historic development characterized it as one of the most interesting overland routes in the State.

The earliest development of the route between Little Rock and Memphis took place in 1821 when, by an act of Congress passed in that year, "a road from Memphis to Fort Smith via Little Rock was authorized."(3) It's development was further stimulated by its establishment as a mail route in 1824.

It was the railroad, however, which first contributed to the real improvement of the route between Little Rock and Memphis. This improvement was stimulated further by the increasing importance of Little Rock. The Memphis and Little Rock Railroad Company, incorporated on January 10, 1853, and later absorbed into the Chicago, Rock Island and Pacific Railroad Company, was the first to develop the overland route between the cities. The last spike on the completed route was not driven until April 11, 1871. Its development faced the same two problems that characterized the development of Highway 70, the river crossings at Madison, over the St. Francis

River, and at DeValls Bluff, over the White River. "On February 20, 1862, that company advertised that trains were operating between DeValls Bluff and Little Rock and it was already operating between the West Bank of the Mississippi River and Madison, Arkansas."(4)

The passage between DeValls Bluff and Madison, interrupted by the rivers, was by Steamer and coach. At this period the Memphis and Little Rock Railroad Company could advertise as an attraction "Only twelve hours staging between Little Rock and Memphis."(5) The costly and complex river crossings at DeValls Bluff and Madison, and the rail route between these towns, was completed by 1871. By 1936 the travel time between Little Rock and Memphis was reduced to two hours and forty-five minutes.(6)

The road route between Memphis and Little Rock, designated State Highway 70 under the State Highway System, faced similar obstructions from the White River and the St. Francis River. The development of a modern vehicular route between Memphis and Little Rock involved, as an essential prerequisite, the bridging of these rivers. Highway 70, following a similar route to that established by the Memphis and Little Rock Railroad Company, crossed the White River and the St. Francis River at locations near the railroad crossings, at DeValls Bluff and at Madison.

DEVALLS BLUFF

DeValls Bluff in Prairie County, a large town situated on the White River, was named after C.S. DeVall "who entered the land upon which it is located."(7) The settlement, dating from the early nineteenth century, grew quickly. Its situation on the White River, and on the Memphis to

Little Rock route were significant factors in its evolution, and guaranteed the town an important trade.

The railway bridge, completed by 1871, was the only bridge crossing the river there until the completion of the White River toll bridge in 1924. The extent of the river, extending some six hundred feet, meant that a ferry crossing was the most simple means of passage. The disadvantage was that the route was impassable during the winter and spring floods. While it was clear that a bridge, allowing permanent crossing of the river, was required, the capital investment needed was a major difficulty. It remained to the visionary Harry E. Bovay to organize the finance and to construct the bridge.

HARRY E. BOVAY

The story of the White River bridge at DeValls Bluff began with the single-minded vision of Harry E. Bovay, an entrepreneur from Stuttgart, Prairie County.

A peculiar feature about this structure (the White River Bridge) is that it was built by a man who, without funds, devised, schemed, and manipulated what at first seemed a vision, but who by concerted effort and the will-power to succeed, turned the vision into a reality. That man is Harry E. Bovay of Stuttgart.(8)

The origin of Bovay's dream lay in his first visit to DeValls Bluff. While waiting with friends outside a hotel, the conversation turned to the "urgent need for a bridge spanning White River."(9) The discussion might never have produced anything but for later visits to the town when, again, he learned about the inconvenience of the ferry crossing.

So, borrowing a car, he drove to the ferry and watched the tourists and others as they crossed back and forth, and he, like the rest, realized the importance and need of a bridge.(10)

Bovay was a man with no knowledge of the process of bridge building, legal, financial or technological. Nor did he have any capital available for the development of a bridge. It was his friends in Washington who advised him on the first stage in the erection of a toll bridge over the White River - Congressional approval.

CONGRESSIONAL APPROVAL

In 1906 Congress passed an act entitled "An Act to regulate the construction of bridges over navigable waters."(11) This act said that any bridge which was intended to be built over waters suitable for navigation was to have prior congressional approval. The White River was considered a navigable water, and consequently required a special act of congress before its erection could be legalized.(12)

Act 103 of the 67th Congress providing for the projected toll bridge was passed on November 23, 1921. Mentioning Bovay by name, it granted him the right to construct a bridge over the White River "just south of the Chicago, Rock Island and Pacific Railroad Companies bridge, near the city of DeValls Bluff."(13)

Bovay acquired congressional approval with comparative ease but, while he had the right to build the bridge, he remained without any suitable financing for such an investment.

FRANCHISE

The first step taken by Bovay towards securing finance for his bridge was to petition the Prairie County Court for a "franchise to build a toll bridge over the White River." The franchise was intended to secure his sole rights to erect a bridge in the vicinity of the town.

The petition, witnessed by Bovay on December 12, 1921, was submitted to the county court on December 19 by his attorneys, J. G. & Cooper Thweatt and Charles B. Thweatt.(14) Bovay petitioned the court for a franchise valid "for a term or period of forty-nine years" which "should be exclusive for a distance not to exceed ten miles above and ten miles below said bridge," thus ensuring himself of a monopoly regarding any bridge he might build.(15) He further requested a ruling on the toll rate to be set for traffic crossing the bridge. Such toll, including concessionary rates, "should stand and not be changed for a period of ten years" and also should "be sufficient or ample to guarantee to this petitioner...a reasonable return for the investment in the construction maintenance of said bridge."(16) The court judged that

for the purpose of securing to the public a speedy, safe and permanent means of crossing White river at said point, that the exclusive right, privilege and franchise to construct, maintain and operate a toll bridge across White River be and the same is hereby granted to the said Harry E. Bovay, his successors and assigns.(17)

The court set a toll rate which ranged from 5 cents per person or head of livestock to 75 cents for an automobile and one dollar for a six-horse carriage. Concessionary tolls were also granted for return trips, valid twenty-four hours, and for trips in multiples of ten.

The county required that the bridge be begun:

within two years from the date of the acceptance of this franchise and the said bridge shall be completed within three years from the beginning of construction of said bridge.(18)

The county retained the right to purchase the bridge "at any time after ten years from the construction of the bridge."(19)

The franchise was granted, with the above stipulations, on the day of its submission, December 19, 1921, with County Judge J. W. Watson approving it with his signature. That same day Bovay signed his acceptance of the franchise and its stipulations.

WHITE RIVER BRIDGE COMPANY

On June 14, 1922, the White River Bridge Company was incorporated by Harry E. Bovay, Burton D. Hurd and Claude C. Bovay.(20) The articles of agreement and incorporation recognized that:

the general nature of the business proposed to be transacted by this corporation is the construction, maintenance, and operation of a toll bridge or bridges over White River or other rivers in Prairie County or elsewhere, for the passage of persons, animals or vehicles of all kinds and the collection of tolls for such passage and the sale of such bridge or bridges, and the transaction of all other business connected therewith or in any way.(21)

The company was formed with a capital stock of \$500,000 of which \$150,000 was preferred stock and \$350,000 common stock. The incorporators of the company purchased \$500 of common stock with the incorporation of the company.

The Certificate of Incorporation recorded Bovay as President, Hurd as Vice President and Claude C. Bovay as Secretary and Treasurer. The headquarters of the company were located in

Little Rock, in Pulaski County, and the articles of incorporation filed with Pulaski County Court on July 21, 1923.

FRANCHISE AMENDMENT

Prior to the filing of the Articles of Incorporation with Pulaski County Court, Bovay's bridge franchise of December 19, 1921, was transferred by him to the White River Bridge Company. In an amendment to the original court order, the transfer of the franchise to the Company was granted by Prairie County Judge J.F. Sims. This amendment was dated July 6, 1922.(22)

Further to the transfer, the court was petitioned by Bovay and his company to amend the toll costs and its system of assessment to the advantage of the company. It was also requested that the company retain its rights to the bridge for twenty years, as opposed to the original ten years. These amendments were granted by the court, which found that it was "necessary to make the amendments requested in the franchise in order to procure the building of said bridge."(23)

The amended toll rates provided an interesting indication of the rapidly increasing importance of cars. The only change in the standard toll charges was the increase in the rate for "automobile and driver" from 75 cents to \$1.00.

BRIDGE DESIGN AND CONTRACT

As the White River Bridge Company had no particular knowledge of bridge construction, it contracted, with great difficulty, the design of the bridge to professional engineers. "Getting an

engineer was another job that racked the brain of the promoter. Many were consulted, but when it was discovered there were no funds, they soon gave it up."(24)

The design of the bridge was eventually undertaken by the firm of consulting engineers, Harrington, Howard and Ash of Kansas City, Missouri. In October 1922 they published a notice to contractors for the White River Bridge Company. The basic specifications of their design were:

Three 200 ft. through truss riveted spans with 20 ft. roadway, wood floor with rock asphalt pavement; about 500 lin. ft. of reinforced concrete trestle approach and 1700 lin. ft. of embankment approach; four river piers with pile foundations; central span to be vertical lift span.(25)

The engineers required three separate bids for "the construction of the river piers and the trestle approaches" for "the embankment" approaches and for "the manufacture, erection, and completion of the river spans and completion of trestle approaches."(26) Each bidder was required to submit, as bond, certified checks of \$2,000 for the embankments and \$5,000 for the other bids, payable to the White River Bridge Company. Bids were to be submitted to the company before 2 p.m., Saturday, November 15, 1922. This deadline, however, was apparently extended one week, to November 22.

BRIDGE CONSTRUCTION

The successful bidder on the contract was the Missouri Valley Bridge and Iron Company of Leavenworth, Kansas. The company was one of the "largest concerns of its kind in the country" and had already proved itself through its work on the Broadway Bridge at Little Rock.(27) It was

also, at the time of commencing the construction of the White River Bridge, "engaged in the construction of the Main Street bridge there."(28)

Preparations for the construction of the White River bridge began in January, 1924. Though few records of the construction have remained, the Grand Prairie Herald in nearby Hazen reported the start of the work:

It may well be said that the actual construction of the Highway Bridge across the White River at DeValls Bluff has begun. The Superintendent of the Missouri Valley Bridge and Iron Works arrived on the scene a few days ago and made arrangements for the handling of material and other work necessary for the actual construction work.(29)

At the completion of the bridge at the end of 1924, the Grand Prairie Herald gave full credit to the people involved in the construction of the bridge:

The first work of actual construction was begun early in February 1924 with C.R. Twiss as foreman of construction. Mr. Twiss was later succeeded by I.E. Hayes. The steel work was directed by John Fraser, erection foreman. O.J. Hillyer was engineer in charge of accounting. E.E. Paul, resident engineer represented the interests of the owners and the consulting engineers, Harrington, Howard and Ash. ...The work on the White River bridge was under the direction of C.F. Greaves, superintendent of construction.(30)

The completed bridge was opened on January 1, 1925, and was hailed as "the last connecting link in the Little Rock-Memphis highway."(31)

COMPLETED BRIDGE

The new bridge over the White River was welcomed by the press as "a boon to the traveling public in general."(32) The Arkansas Democrat of January 1 reported that "for the first time in

history a through road between the two cities [Memphis and Little Rock], passable for auto traffic during the rainy season, is available."(33)

The scale of the undertaking clearly impressed the press and public, and detailed reports of the completed bridge were available in the papers. Once again the Grand Prairie Herald provided the most complete report available on the new structure:

The center, or lift, span weighs 200 tons and operates on two 80-foot towers on which it is suspended by thirty-two one and a half inch steel cables attached to two counter weights, the combined weight of which is the same as the span. The draw is operated by gasoline motor, but if necessary it can be operated by hand. A total rise of fifty feet gives a clearance of fifty-five feet above extreme high water. Only two of three minutes time is required to raise the draw. ...The total weight of the steel structure, including machinery, is over 1,000,000 pounds.(34)

The cost of the completed structure to the White River Bridge Company, as submitted to the Prairie County Court on December 30, 1924, was \$302,111.(35) Included in this costing was the bridge, tool house, approach roads and general expenses. The cost of the bridge proper was recorded as \$246,782 of that total.

BRIDGE OWNERSHIP

Ownership of the bridge, in the late 1920s, passed through a variety of hands before it was eventually purchased by the state of Arkansas. Responsibility for its maintenance was then passed to the State Highway Department. On September 6, 1927, the White River Bridge Company transferred its assets, including the bridge, to a Delaware Company, the White River Bridge

Company, Inc.(36) The Arkansan company, with W.E. Lenon as President and H.W. Trigg as Secretary, was dissolved in the next year, on December 29, 1928.(37)

The ownership of the bridge was then transferred to the White River Bridge Corporation, again a Delaware Company. The transferral, recorded in the Deed Records of Pulaski County, was signed by Ike Kempner, President of the White River Bridge Company, Inc., and W. E. Lenon, Secretary to the company.(38)

The bridge was finally purchased from the White River Bridge Corporation, by the State of Arkansas, on November 1, 1930. It was purchased for the nominal sum of one dollar and the acceptance of a bond debt of \$430,000, a total cost of \$463,001.(39)

LATER DEVELOPMENTS

Prior to the purchase of the White River bridge by the state, the Arkansas State Highway Department began the design of new approaches to the bridge. Permission for their reconstruction was filed with the War Department on October 30, 1930, and approval received on January 12, 1931.(40) That same year the approaches were constructed and the bridge provided with a new deck.(41) The bridge was re-floored again in 1955 and 1960, a testimony to the success of the original bridge.(42)

The bridge was closed, for a twenty-two month period from February 1972 to December 1973, when "erosion caused footing under the east pier to partially collapse, causing the pier to lean about eight feet off center."(43) A new pier was constructed to replace the older pier.

The bridge was closed again on January 7, 1988, when the new pier "was struck by a tug and four barges moving downstream." (44) The accident caused the pier "to be knocked about twelve inches off center at the top." (45) It was further recorded that:

The overhead trusses were also damaged by the counterweights on the lift span, which was in the raised position to allow river traffic to pass at the time of the accident. (46)

Today, the bridge remains inoperative, although it is being renovated by the Arkansas State Highway and Transportation Department.

ENGINEERING DESCRIPTION

The White River Bridge at DeValls Bluff consists of two 201-foot Pratt trusses flanking a 204-foot Pratt vertical lift span, with 239 feet of concrete deck girder approach spans on the west and 812 feet of the same approach spans on the east. All three Pratt trusses have nine panels, with double diagonals in the center panel. The lift span has a vertical impost, while the end spans have inclined imposts at the approaches. The panels next to the lift span form the bases for the lift towers. The towers have four vertically oriented Pratt panels, which decrease in depth and width up the tower. At the top, large sheave wheels are used to hoist steel cables to lift the bridge. Over 55 feet of vertical clearance can be obtained.

The members in general are built-up from channels, angles, plates, and lacing. The individual pieces are riveted together to form each member. All joints are rigidly connected with rivets. The top chord is riveted throughout its length to form one continuous member, made from two channels with a top plate and double lacing on the bottom. The bottom chord, also one

continuous member, consists of four angles connected by batten plates. The diagonals and verticals are identical to the bottom chord, except that the verticals have lacing instead of plates.

All the bracing is constructed from angle bars also. The portal and sway braces are two-panel, double-intersection Warren trusses. Four angles with lacing and two riveted angles form the top and bottom chords, respectively, of these braces; single angles form the diagonals and verticals of the braces. This particular truss brace is used as all the sway bracing and as the portal brace for the end panels of the end spans. The portal brace for the panels near the lift span and on the lift span have a top chord made of four angles which form a tubular section, with lacing and batten plates joining the angles. The bottom chord and web members of the portal brace consist of two angles with lacing. The top and lower lateral braces are angles diagonally spanning one panel.

The lower lateral braces connect to the I-beam floor girders, which rest on top of the bottom chords. The ten I-beam stringers, running across the top of the girders, support a floor deck which is a steel mesh.

The complete drawings for the bridge are not available, so the mechanical system of the lift span is not known past what has already been mentioned. The operator of the bridge sits in a one-room operator's house located outside the center panel of the lift span, from which he can see river traffic and control the bridge lift.

ENDNOTES

1. Murray, J. C. "States Fine Transportation Facilities", Arkansas Centennial 1836-1936, Arkansas Democrat, 1936, p. 64.
2. *ibid.*, p. 65.
3. *ibid.*, p. 64.
4. *ibid.*
5. *ibid.*
6. *ibid.* p. 65.
7. Goodspeed, Biographical and Historical Memoirs of Eastern Arkansas, New York, 1890, p. 679.
8. "Magnificent Structure Crowns Efforts and is Reward of Three Years Hard Work", Grand Prairie Herald, January 22, 1925, p. 1.
9. *ibid.*
10. *ibid.*
11. Historic American Engineering Record, HAER Report AR-8: "Black River Bridge." 1988.
12. *ibid.*
13. Public No. 103 - 67th Congress. AHTD Microfilm Files.
14. Prairie County Court Record Book "T", December 19, 1921, pp. 267-273. Copy certified by County Clerk Chas. C. Tunstall, February 2, 1925. AHTD Microfilm Files. (Precise page numbers not available.)
15. *ibid.*
16. *ibid.*
17. *ibid.*

18. *ibid.*
19. *ibid.* Objections to the franchise were raised by J. McClintock on the grounds that the franchise infringed on his ferry rights. A more complete discussion of this may be found in Dougan's The Doctrine of Creative Destruction cited in the bibliography.
20. *c.f.* Articles of Agreement and Incorporation of White River Bridge Company and Certificate of Incorporation. Both recorded in AHTD Microfilm Files.
21. Articles of Agreement and Incorporation of White River Bridge Company, *loc.cit.*
22. Prairie County Court Records Book "T", July 6, 1927, pp. 497-502. Copy, certified by B. R. Harrison, County Clerk. Available in AHTD Microfilm Files. (Precise page numbers not available.)
23. *ibid.*
24. "Magnificent Structure Crowns Efforts..." Grand Prairie Herald, *loc. cit.*
25. Harrington, Howard and Ash, White River Bridge, Notice to contractors, October, 1922.
26. *ibid.*
27. "Magnificent Structure Crowns Efforts..." Grand Prairie Herald, *loc. cit.*
28. *ibid.*
29. "Work is Started at White River Bridge at DeValls Bluff", Grand Prairie Herald, January 17, 1924.
30. "Magnificent Structure Crowns Efforts...", Grand Prairie Herald, *loc. cit.*
31. "New Bridge over White River Open for Auto Traffic", Arkansas Democrat, January 1, 1925, p. 1.
32. "New \$300,000 Bridge Links Memphis Little Rock Route", Arkansas Democrat, January 1, 1925, p. 2.
33. "New Bridge Over White River Open for Auto Traffic", Arkansas Democrat, *loc. cit.*
34. "Magnificent Structure Crowns Efforts..." Grand Prairie Herald, *loc. cit.*

35. Prairie County Court Record Book "U", December 30, 1924, p. 170.
36. Prairie County Deed Record, Book "10", September 6, 1927, p. 554. Copy certified by W. M. McQueen, Clerk, April 1, 1930. Available in AHTD Microfilm Files.
37. Certificate of Dissolution of White River Bridge Company, December 28, 1929. Copy available in AHTD Microfilm Files.
38. Prairie County Deed Record "10", May 8, 1928. loc.cit.
39. Bridge 1531, Card Index AHTD.
40. F.B. Wilby, Lt. Col., Corps of Engineers, to D. H. Blackwood, Chairman, State Highway Commission, January 12, 1931. AHTD Microfilm Files.
41. Bridge 1531, Card Index AHTD.
42. *ibid.*
43. "Barges Damage Bridge at DeValls Bluff", Arkansas Highways, Spring 1988, p. 6.
44. *ibid.*
45. *ibid.*
46. *ibid.*

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Arkansas State Highway and Transportation Department, Bridge Section: Card Index, Microfilm Files and Drawings. Ref. Bridge No. 1531, Job No. 6120.

DeValls Bluff Democrat, December 18, 1924, p. 1. (Poor Copy).

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